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FLATHEAD INDIAN RESERVATION

SUMMARY ENVIRONMENTAL ASSESSMENT FOR THE DRAFT FOREST MANAGEMENT PLAN

1982—1991

MANAGEMENT PERIOD

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INTRODUCTION

This document briefly summarizes the environmental assessment of the 1983 Forest Management Plan for the Flathead Indian Reservation. It is intended for interested parties who can review the major points of the full document without reading the entire 306-page report. The reader is encouraged to refer to the full report for expanded discussions on the material presented in this summary.

Purpose of and Need for Action

The primary purpose of the Environmental Assessment (EA) is to provide an analysis for determining whether implementation of the proposed Forest Management Plan will have a significant impact on the quality of the human environment. Both the National Environmental Policy Act and 30 BIAM Supplement 1 require that an environmental analysis be prepared for reservation Forest Management Plans. If the Superintendent or the Portland Area Director conclude, after the EA and draft plan have passed the review and comment procedure, that the impact may or will be significant, an Environmental Impact Statement (EIS) will be initiated. If it is concluded that impacts will not be significant, the Superintendent will sign a FONSI ("Finding of No Significant Impact").

Every ten years, the Forestry Branch of the Bureau of Indian Affairs (BIA) for the Flathead Indian Reservation revises various aspects of the forest management plan. The purpose of the forest management planning is to provide the guidance required to effectively manage the forest land resource of the reservation. Forested areas of the reservation are shown in Figure 1. Effective forest management is management that accomplishes the goals and objectives of

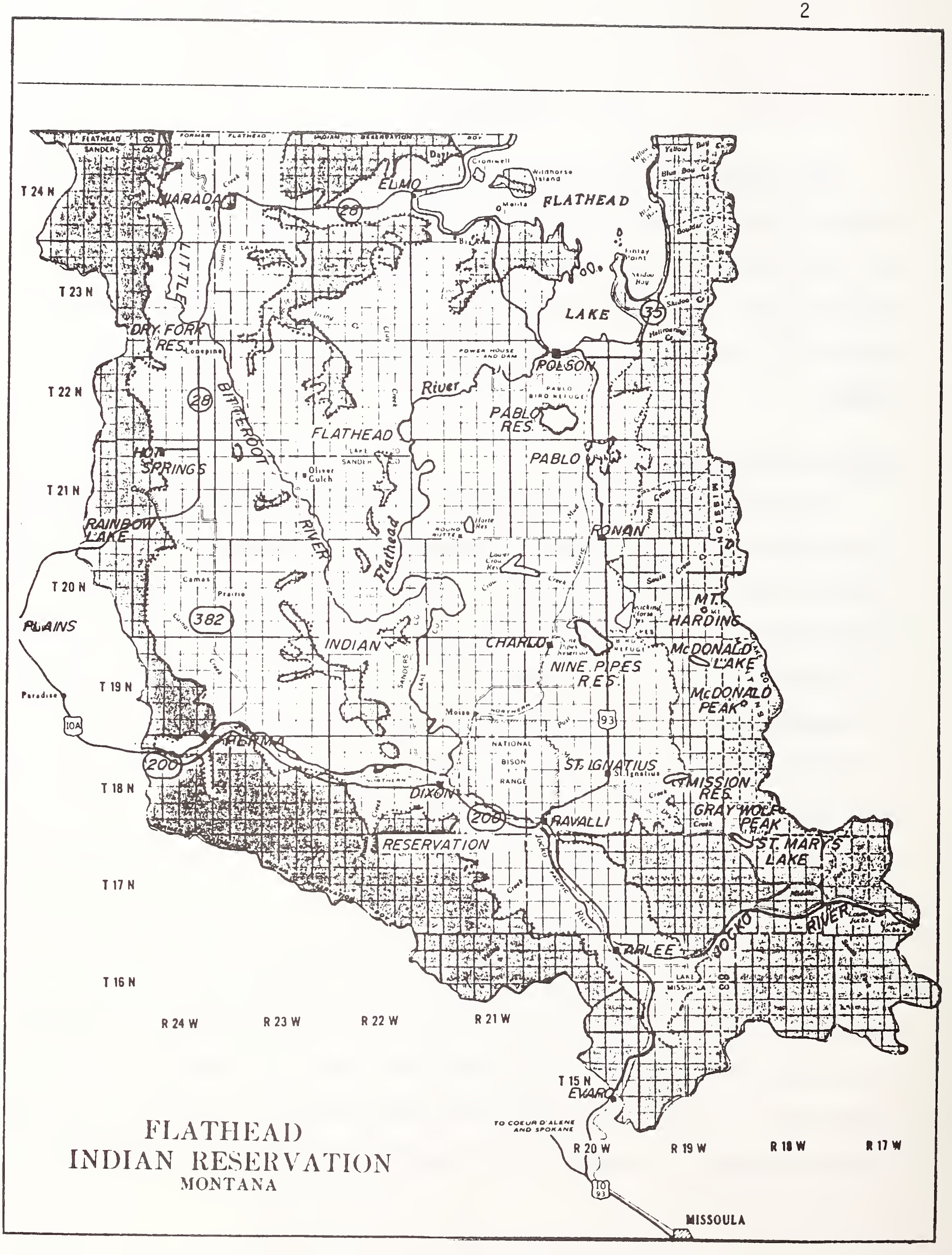

Figure 1. Forested Areas (shaded) of the Flathead Indian Reservation.

the Confederated Salish and Kootenai Tribes and the Bureau of Indian Affairs. The forest management planning process at the Flathead Indian Reservation has been a cooperative endeavor involving both the Confederated Salish and Kootenai Tribes and the BIA.

On January 25, 1982 the Branch of Forestry met with the Tribal Council to discuss goals, objectives, and basic forest policy. Various members of the Branch of Forestry began writing the draft plan. In June 1982 the planning effort continued with forester Jim Stires, Billings Area Office, visiting the Flathead Agency. Mr. Stires outlined the tasks and projected time frames for the planning effort. The University of Montana was selected as the contractor to prepare the Environment Assessment (EA) for the plan. A scoping committee was formed to identify forest management issues and concerns for the EA team. Participants in the scoping process included: Forest Manager, Forestry Section Heads, Branch of Wildlife, Branch of Land Services, Tribal Council, Tribal Forest Management Enterprise, and Tribal Natural Resources Department. Alternatives were developed for sensitive management concerns such as precommercial thinning, use of herbicides, even-age cutting block size, and slash disposal. The Tribal Council reviewed the alternatives and selected a preferred alternative. In October of 1982 the Council also reviewed and approved the Management Objectives and Goals for the 1982-1991 Forest Management Plan.

During the fall of 1982 the Branch of Forestry prepared the draft Forest Management Plan in light of the preferred alternatives and management objectives selected by the Tribes. On January 17, 1983 the draft plan was given to the University, and the EA team began preparing the assessment of the plan.

A major characteristic of this EA is that the discussion of the impacts tends to be general in nature and broad in amplitude. This was a consequence of two factors. First, many EA's are site specific, meaning the management action pertains to a certain area or location where most site characteristics (slope, aspect, timber volume, wildlife usage) are constant. However, this EA covers the entire reservation, thus encompassing many ecological and topographical diversities. Therefore, in order to account for all possible environmental impacts, the EA team tended to keep the assessments general, delving into specifics only when certain environmental components would be affected. Secondly, in order for the authors of an EA to describe management impacts on a resource in qualitative terms, a substantial data base is required. The data base supplied by the Flathead Agency in Pablo was limited in many areas, thus causing the authors to describe the impacts in general terms rather than submitting specific assessments that they could not substantiate with reliable data.

Objective of the Environmental Assessment

The basic objective for this EA is to evaluate the preferred alternatives of the 16 management policies stated in the contract and presented in the management plan from the aspect of the following list of reservation resources:

1. Geology, Minerals and Topography
2. Surface Hydrology
3. Range
4. Soils
5. Timber and Other Vegetation
6. Wildlife
7. Wilderness
8. Fisheries
9. Recreation

10. Human and Community Developments
11. Threatened and Endangered Species
12. Ecological Interrelationships

In addition, separate chapters were written describing the collective impacts of all the management concerns on the cultural and archaeological resources and the aesthetic resources of the reservation. This was done because stratification by management concern would prove repetitive and inefficient. The EA also contains an abbreviated synopsis or summary of the reservation's natural and cultural resources.

Contributors

This EA was developed as follows: For each resource topic, a specialist was employed to assess the impacts on that resource for every management concern. The impacts assessed were those from the identified preferred alternatives. This method provided diverse and state-of-the-art assessments needed for a complete discussion of management impacts. Seventeen specialists contributed to the development of the EA.

Format of the Environmental Assessment

The assessment has been designed so it may be used as a handbook for Tribal and BIA personnel to quickly and efficiently research the impacts on a resource for any management concern.

The EA is divided into two parts with the first part containing five chapters. The first chapter is introductory material. The second and third chapters briefly describe the Flathead Indian Reservation's valuable resources in terms of the social and economic setting, and the physical and biological setting. The last two chapters present the collective impacts of all identified preferred alternatives on the archaeological and cultural resource and the aesthetic resource.

The second part of the EA is the heart of the document. It presents the impact for each management concern by resource topic. Each of the 16 subunits of the second part is dedicated to a specific management concern. Every subunit begins with a background section describing management policy and problems thus far experienced by the BIA Forestry Department. Then each subunit is separated into 11 distinct sections where each section deals solely with a certain resource topic. Each one of the resource sections is then broken down into three sub-sections. The first sub-section describes the specific environment which will be affected by that management concern within the resource topic. The second and third sections present the direct impacts and indirect impacts, respectively, of the management concern on that resource topic.

Management concerns with the Proposed Alternative are discussed in the assessment. The Proposed Alternative is a concise statement of proposed policy for the 1982-1991 Forest Management Plan. For further information the reader should refer to the management plan.

The Environmental Assessment, then, is a product of 17 scientists from various fields of environmental expertise, using a limited data base to assess the potential impacts of 16 management policies from the aspect of 11 resource topics. Discussion of the impacts refers to specific areas or examples only when data were substantial; otherwise, general or broad statements were presented. Areas where scientific information is lacking are pointed out within the document.

The University of Montana interdisciplinary team addressed the Proposed Alternative. Additional alternatives required by NEPA have been developed and analyzed by BIA Flathead Agency staff. Discussion of these alternatives is attached to the EA as a separate report.

SOCIAL AND ECONOMIC SETTING

The Flathead Reservation of Montana was established by the Treaty of Hell Gate in 1855 as a homeland for the Pend d'Orielle, Kootenai, and later, for the Salish people from the Bitterroot Valley. The boundaries of the reservation as established by survey encompass some 1,248,000 acres. Approximately half of the original parcel was tranferred to non-Indian ownership under the allotment policy of the federal government--a process that spanned the period between 1887 and 1934 and included opening of the reservation to White settlement. Today, the U.S. government holds title to some 620,000 acres in trust status for the Confederated Salish and Kootenai Tribe that include 570,000 acres of tribal land and 49,000 acres of individual tribal allotments.[1] The remainder of the land within the reservation's exterior boundaries is either private, fee patent land or U.S. Department of Interior and State of Montana lands. The majority of tribal land is located in the outer periphery. This is basically the forested mountain areas while the valley agricultural land is, for the most part, in non-Indian ownership.

Within the State of Montana's political jurisdictions, the Flathead Reservation is located within the geographic boundaries of four counties: Flathead, Lake, Missoula, and Sanders. Census figures for 1980 indicate that the majority, or 87% of the reservation's populations of 19,628 persons, reside within Lake County. Persons classified as American Indian (3,771) constitute only 19% of the total reservation population.

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[1] "Flathead Reservation Class I Air Quality Redesignation" prepared for the Confederated Salish and Kootenai Tribes, October 15, 1980, pp. 20-21.

Employment and Income Distribution

Tribal employment and income statistics provide a partial picture of the socio-economic setting of the reservation. Census data indicate a 20% rate of unemployment for tribal members 16 years of age and over. This rate is high when compared with the state of Montana rate of 5%, but is not out-of-line with that of other Montana reservations. Data are not available for non-tribal members on the reservation. Unemployment appears even higher in a January 1983 report of the BIA where it was estimated that 31% of those 16 and over and able to work were employed.

Census surveys of persons whose poverty status was determined indicate that 40.5% of Flathead Indian Reservation residents' incomes were below the poverty level. BIA data include an estimate of those employed in both full-time and part-time jobs who earn $7,000 or more. For the Flathead Indian Reservation this represents 48%, or 359 individuals. However, these figures may be misleading, since tribal members pay no state taxes, are provided health benefits, and benefit from tribal membership that reduces the cost of living.

The economic characteristics of the tribal reservation residents are perhaps more meaningful when viewed in comparison with their neighbors. Lake County data (where 90% of the Indian population resides) indicate quite distinct employment and income differences between Indian and White populations. Thus, while almost identical proportions of both populations are included in the labor force, the unemployment rate for Indians is more than double that of their White counterparts. This disparity may be the result of factors in addition to availability of jobs. Indian household income is 30% lower and Indian family income 30% lower than comparable White groups. However, since the Indians receive additional financial benefits from being tribal members, their lower income level may be misleading. Finally, the proportion of Indian individuals whose incomes were below the apparent poverty level was three times that of comparable White individuals.

In addition to public administration, the combination of agriculture, forestry, fisheries and manufacturing (which includes workers in the wood products industries) provides the major source of Indian employment. The latter category is also a major employment source for White workers. It should be noted that census data may under-report the forest-related employment due to classification of woodlands workers under the transportation or self-employment categories.

The BIA forestry program, the tribally owned post and pole yard at Dixon, and one privately owned area mill employ approximately 55 full-time and 251 seasonal Indian workers.[2] No estimates of individual wage earnings from these employment sources are available. Wage income from both tribal and federal sources declined considerably from 1980.

It is difficult to gauge income from self-employment and other activities which generate income. For example, the tribal government has for over forty years allowed tribal members with and without permits to harvest Christmas trees from tribal forests.[3] This activity is a source of self employment and income. It is unknown how many individuals or families benefit from those resources or how much income they derive. Likewise, the availability of food products from traditional subsistence activities such as hunting, fishing and gathering on reservation lands provides another source of income which cannot be accurately determined.

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[2] September, 1983 telephone conversations with representatives of the BIA Forestry Program, Tribal Post and Pole Yard and one area mill. Another mill would not disclose employment statistics by race of employee.

[3] Historical Research Associates, "Timber, Tribes, and Trust". Missoula, MT., May, 1977, pp. 225-236.

Reservation Resources and Tribal Government

All of the land within the exterior boundaries of the Flathead Reservation, even land owned by non-Indians and incorporated communities is classified as "Indian Country". The meaning of the term for the Flathead Reservation was clarified in a 1982 Supreme Court ruling.[4] Political jurisdiction over the reservation territory resides with the Confederated Salish and Kootenai Tribal government. Powers of the Tribal Council include the powers:

> to regulate the uses and disposition of tribal property, to protect and preserve the tribal property, wildlife and natural resources of the Confederated Tribes ... and to approve or veto any sale, disposition lease, or encumbrance of lands and tribal assets which may be authorized or executed by the Secretary of the Interior, the Commissioner of Indian Affairs, or any other agency of government...[5]

Within the last few years, the Tribal Council has made several significant decisions which have had the effect of exercising their jurisdictional powers and of shaping the conditions for the future development of tribal resources. One such decision was the resolution adopted in July of 1979 to request reclassification of the air quality on the Flathead Reservation from Class II to Class I. The Class I designation, which was granted in May, 1982, has significance because of the stringent standards it imposes upon sources which emit pollutants. Further, the Flathead Reservation is distinguished as one of the few non-wilderness areas in the country with a recognized pristine airshed.

Creation of the Mission Mountain Tribal Wilderness area is another example of a tribal choice which affirmed commitment to a high quality environment and to the preservation of cultural and spiritual values associated with the land.

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[4] Polson, Montana v. Confederated Salish and Kootenai Tribes of Flathead Reservation (CA9, 665 F 2D 951).

[5] James J. Lopach, Margery H. Brown and Kathleen Jackson, "Tribal Constitutions: Their Past-Their Future", Missoula, Mt: Bureau of Government Research, August, 1978, pp. 20-29.

Timber has long been the major tribally controlled economic resource. Timber is also an unstable source of tribal income. Great volatility in annual harvest and income from timber harvest are indicated. The 1982 harvest volume was about two-thirds the 1979 level of harvest and the value of the 1982 harvest fell over 300% from the 1979 level.

It is clear that tribal income from timber receipts has fluctuated significantly in the last ten years. Income from tribal timber amounted to some \$5 million and represented 72% of total gross tribal income in 1973.[6] By marked contrast, in 1983, estimated timber receipts totalled only \$1.3 million and constituted only 24% of the gross tribal income.

PHYSICAL AND BIOLOGICAL SETTING

Biota

Flora. The Management Plan states: "It will be the policy of the Branch of Forestry to use habitat types, as a major tool in developing silvicultural and management prescriptions for the Flathead Reservation." Thus, land stratification by habitat types is a very important element in forest land management. A habitat type includes all land areas potentially capable of supporting similar plant communities at climax.[7]

The dominant habitat series on the Reservation is the Douglas-fir (*Pseudotsuga menziesii*) series. Sixty-one percent of the forested part of the Reservation is the Douglas-fir habitat series, 19 percent is the grand fir (*Abies grandis*) series, and 15 percent is the subalpine fir (*Abies lasiocarpa*) series.

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[6] Leo K. Cummins, "Flathead Indian Reservation Forest Land: An Environmental Assessment". The Confederated Salish and Kootenai Tribes of the Flathead Reservation, Pablo, Montana, April, 1974, p. 9-12.

[7] Pfister, R.D., B.L. Kovalchik, S.F. Arno and R.C. Presby. 1977. Forest Habitat Types of Montana. USDA Forest Service, Intermountain Forest and Range Expt. Stn., Ogden, Utah. 174 p.

The environment varies from very dry and warm at low elevations to very cold at high elevations, near timberline. Plant growth forms generally vary from ponderosa pine (*Pinus ponderosa*) and bunchgrasses on the dry sites to subalpine fir, white bark pine (*Pinus albicaulis*) and subalpine larch (*Larix lyalli*) in the overstory near timberline. Timber productivity varies from less than 15 to 45 cu. ft./ac./yr., but more importantly, the potential exists for increasing the timber productivity of the better sites to over 100 cu. ft./ac./yr.

Habitat types are distributed in predictable patterns. Grand fir types occur throughout the forested lands of the reservation, subalpine fir types are mostly found on the east and south sides, on the higher slopes of the Mission Mountains and Nine-mile Divide. Ponderosa pine types are mostly at the grassland-forest ecotone and western red cedar (*Thuja plicata*) occurs as narrow riparian areas throughout the reservation.

Range. The range resource of the reservation includes all forests (commercial and non-commercial) and grasslands capable of providing forage for grazing and browsing animals. Approximately 335,000 acres have been identified as range for livestock and wildlife on the reservation. About two-thirds of this acreage is categorized as commercial forests and are thus subject to multiple uses.

The forested ranges in western Montana can be classified as permanent or transitory forest ranges. The permanent forest range is characterized by an open overstory of ponderosa pine and/or Douglas-fir with an understory of bunchgrasses and shrubby species. On the reservation, the ponderosa pine and Douglas-fir/bunchgrass types account for an estimated 5 percent of the forested lands.

Douglas-fir habitat types that are transitional between bunchgrass habitat types and those dominated by shrubs also supply much permanent forage range. These areas are good for forage production and comprise 24 percent of the reservation.

Transitory ranges are those forested lands that have been altered with partial or total tree removal so that the vegetation is mostly grasses, forbs and shrubs. These areas are available for use by livestock for a number of years until tree regeneration closes over the areas.

The transitory forest ranges occur in dense stands of Douglas-fir and western larch (Larix occidentalis), Engelmann spruce (Picea engelmanii) and subalpine fir or associated forest types. Most of the livestock grazing in this zone occurs on dry parks, meadows and riparian areas or on areas that have been logged or burned.

Grand fir, western red cedar and Engelmann spruce sites are of minor importance to livestock but clearcuts in the spruce-fir zone are very productive, and may produce over 1200 lbs./ac. of forage. Livestock grazing on subalpine fir and mountain hemlock (Tsuga mertensiana) climax types is not important, but some grazing could occur on clearcuts. However, these areas comprise only 13% of the commercial forests and should not be considered as potential grazing sites because of wildlife values.

Fauna. The 1982-1991 Forest Management Plan contains an excellent description of the fauna on the reservation, along with habitat information for the various species. The reader is encouraged to read the wildlife section of the plan for information in addition to that presented below. Fauna do not play the central role in forest management decisions as does the flora (habitat types), and most attention is focused on the big game species common on the forested part of the reservation: white-tailed and mule deer, elk, black bear (Ursus americanus), grizzly bear (Ursus horribilis), moose (Alces alces), bighorn sheep (Ovis canadensis) and mountain goats (Oreamnus americanus). Grizzly bears, bighorn sheep and mountain goats are found mainly in the Mission Mountains; the others are widely distributed throughout the reservation.

Numerous nongame species are found on the reservation in a wide range of habitat conditions. A list of the species is too extensive to include in this report. There is a need to survey the nongame fauna and identify their habitat needs for the reservation.

Endangered and Threatened Species. Six animal species are considered endangered or threatened in the general area that includes Montana, but only the endangered gray wolf (*Canis lupus*), endangered bald eagle (*Haliaeetus leucocephalus*), endangered peregrine falcon (*Falco peregrinus*) and threatened grizzly bear occur in the general area included in the reservation. Gray wolf sightings are extremely rare in Montana; a positive identification has been made on the reservation.

The bald eagle has been well studied within the reservation by biologists of the Bureau and the Tribe. Approximately 400 winter in Montana, but the number wintering on the reservation is unknown. Bald eagle data were last collected in 1979-1980. Many migrate through the reservation, although some are resident birds. The residents nest on islands in Flathead Lake and along the Flathead River, and they concentrate near food sources, especially carrion.

Known and suspected nest sites of peregrine falcons are kept in records in the B.I.A. office. The grizzly bear is very well studied in Montana and well discussed in the Management Plan.

Fish. The fisheries resource is very extensive across the reservation. The major waters containing important fisheries include Flathead Lake, Flathead River and the Jocko River. Lake, Nine Pipe Refuge, Saint Marys Lake, and numerous reservoirs, creeks and lakes support major fisheries that are a valuable source of food and recreation to Indians and non-Indians alike. Common trout species found in the region are all present in reservation waters, along with salmon, lake trout, bass, northern pike, perch and various other game and nongame species.

Geology

The Flathead Reservation is underlain by basement rock of Beltian age, which constitutes over 20,000 feet of argillites, quartzites and carbonates more than 1 billion years old. Tertiary sediments fill the major valleys with shales and sandstones, ending abruptly against faulted mountain fronts of early Tertiary age. Surficial sediments of Pleistocene (glacial) and Recent age mantle the Tertiary formations and form river, lake and outwash deposits of sands and silts across the valley floors. Occasional young (Mazania age) volcanic ash deposits are inter-bedded with sands and silts of Pleistocene age. East-facing mountain slopes are commonly dip-slopes, and therefore, are more unstable, though generally flatter, than west-facing mountain slopes.

Current drainage systems which cut Belt rocks on the Reservation are usually underloaded and downcutting in character. Soils developed upon Belt rocks are usually thin, change little in chemical character from the original rock mineralogy, and are easily eroded or disrupted from place of origin.

Valley Fill Deposits. Tertiary valley fill forms outcrops on the lower slopes of the mountain blocks and in the valley proper. Soils can be thin to moderate in depth, fragile in structure, and easily erodable when disturbed without precaution for rapid stabilization.

Pleistocene and Recent Sediments. Glacial Lake Missoula sediments and associated glacial deposits dominate the youngest rock section on the reservation. These deposits are mainly lake silts or delta sands and outwash associated with different lake levels during Pleistocene history.

Where lake silts and glacial material compose the surface outcrop on the Reservation, the "soil" material is relatively stable, thick, and flat lying. Recent overbank deposits along the Flathead River and tributaries constitute the youngest sediment on the Reservation.

General Surface Hydrology Perspective

The Reservation is topographically and climatically complex. The hydrology of the lower elevations is rain dominated. Much of the forest environment is arid to semi-arid. Evapotranspiration demands exceed precipitation inputs. Water yield increases (short-term and long-term) are not expected from forest management activities in general.

The highest elevations exhibit rain and snow-dominated hydrology. Precipitation generally exceeds evapotranspiration. Water yield increases following forest management activity will occur on these sites. Water yield increases typically appear as accelerated snow melt runoff because of reduced soil moisture recharge requirements, and as higher summer and low flows, because of the reduced evapotranspiration draft.

Suspended sediment is the principal water quality problem associated with forest management activity. Sediment is produced by channel erosion and by hillslope processes.

Erosion will follow site disturbance on hill slopes. The question is if and when detached material (soil and plant) will be introduced to streams. The most important determining factors in sediment delivery are: (1) availability of water for surface runoff (precipitation minus infiltration), (2) ground cover remaining after disturbance, (3) slope gradient, and (4) delivery distance (distance of sediment source to a stream channel). Thus, sediment production following forest management activity is going to be very site specific.

The following generalizations were made for the Environmental Assessment:

Available water for runoff: Rainfall intensities in Montana's timber harvest zone don't exceed infiltration capacity unless fire has produced a temporary hydrophobic condition or soil compaction has been severe.

Ground cover remaining: This is generally a function of the intensity of disturbance. For example, high intensity fire or tractor activities disturb ground cover more than cable logging.

Slope: The steeper the slope, the greater the likelihood of sediment delivery, all other factors being constant.

Delivery distance: In general, as the size of the disturbed area increases, the distance to a stream channel is likely to be less.

Soils

Soil Perspective. Soil is defined here as the mineral and organic mantle of the earth's surface in which trees and associated vegetation grow, including roots, rocks, microorganisms, nutrients, organic molecules, gases, animals, and water. The soils to be discussed are only forest soils, or soils capable of supporting trees.

Soil profile descriptions, chemical and physical data, vegetation descriptions, slope, aspect, habitat types and capability ratings are available for the Flathead Indian Reservation for Lake County through the Soil Conservation Service and data from differing areas such as the Flathead National Forest. The soil survey for the Flathead National Forest is included because many of these soils also occur on the Flathead Indian Reservation.

The reader is directed to existing soil surveys for profile descriptions and details of classification. For portions of the Flathead Indian Reservation outside of Lake County or the Flathead National Forest where soil surveys and soils maps do not exist, the manager will have to classify the soil and match the descriptions to those from the existing survey profile descriptions before beginning to use this assessment.

The Soil Conservation Service (SCS) mapped most of the reservation before 1972. Since then, the SCS has mapped the area north of the Flathead River and west of Flathead Lake. There will be two years of mapping unit verification:

the report will be published at least three years later. Thus, the final report will probably not be available in published form until 1990.

Soil Types and Distribution. About 40 percent of the forested area has a mantle of volcanic ash.

The most common soils in the forest zone have very little development: about two-thirds of the reservation or 86 percent of the forested part of the reservation has Inceptisols. These are soils without alluvial clay horizons, and they probably are rather stony and not very deep.

The Andic subgroups merit special attention. These are soils with mantles 7-15 inches thick composed of brown, fluffy volcanic ash. The ash was blown into western Montana following some major eruptions in the Cascades. The ash imparts extremely favorable physical properties to the older soil: very low density, high porosity, high infiltration rates and high permeability. Ash is less common on dry sites; it is not found on ponderosa pine or Douglas-fir/bunchgrass types. It is usually on sites above 4,200 feet in elevation and is thicker (10-12 inches) in the east side (Missions) than in the west side (5-8 inches).

ARCHAEOLOGICAL AND CULTURAL SETTING

There are several federal laws designed to record, protect and to preserve archaeological and historical sites on federal lands, and on Indian lands. The management of reservation lands and forests must consider these laws as important when planning timber harvests, planting, or other federal undertakings connected with forests.

A survey of archaeological and historical sites on the Confederated Salish and Kootenai Reservation was prepared in 1973, and it provided a good sampling of their numbers, types, and density throughout the reservation. Eighty-four sites, so far, have been located, but a more intensive survey on the reservation would undoubtedly yield many more. There is no question that many of these would be discovered in the timbered portions of the reservation. Mitigation efforts would be taken to comply with legal regulatory requirements.

Most of the human occupation during prehistoric times as well as the present time is primarily in lower elevations, or the valleys. Seasonal activities, however, have required that the inhabitants move into the mountainous areas as well, particularly in seasonal quests for plant foods and for game. The mountains also had to be crossed, sometimes even during the wintertime, in maintaining communications or when travelling on war, hunting, or trade expeditions. Thus, trails can be considered to be of prehistoric and historic interest, too. Moreover, some mountain areas have some religious significance, a matter which is discussed more thoroughly in the Assessment.

It is in the mountains where most of the timber resources are found, although there is some timber around the shoreline of Flathead Lake, and in some places long the river courses. Usually, the valleys lack large stands of timber, and they may support grasslands, some brush, deciduous trees, and junipers.

Cultural Management of Federal and Indian Lands and the Laws

When a portion of a forest is scheduled for harvesting, or for some other operation (planting, etc.), local officials should contact the "State Preservation Officer," in the Montana State Historical Office, Helena, Montana, requesting a "file search" for any records of sites which may already be known in these localities. This information may help local officials decide about the need to make further studies of the area before operations commence or during the operations.

If existing information indicates the possibility of cultural sites being present, then a decision must be made about whether to conduct a survey or not. There are penalties to be considered if laws are not followed.

Decisions concerning whether to save or destroy sites would involve an input from a number of other individuals or groups in addition to those directly involved in forest management. For example, tribal councils, cultural committees, and history groups would be concerned with sites.

If a site is declared not to be of major significance, then it might be destroyed. First, however, information about it must be recorded. It may be necessary on other occasions to maintain a "watch" at the site while it is being destroyed. This is in case hidden details and features come to light while machines, people, or other operations should uncover specimens, structures and signs of human activity not observed from the ground surface.

Types of Sites

People have occupied lands within the boundaries of the Reservation for at least 5,000 years, and probably much longer. There are at least 19 types of sites which have been recognized so far on the Reservation. These are: (1) occupation sites (prehistoric), (2) camp sites, (3) rock shelters or caves, (4) dwellings, impressions of pit lodges, cabins, (5) tipi rings, (6) root roasting pits, (7) sweat house remains, (8) pictograph panels, (9) vision quest sites, (10) stone piles, (11) stone quarries, (12) burials, (13) battle pits, (14) debarked trees, (15) dance grounds, (16) hot springs, (17) eagle-catching or wolf-catching pits, (18) historical sites, and (19) trails.

Occupation Sites. Of the 84 archaeological sites which have been discovered and recorded so far, over 60% of them are ancient occupation areas or grounds.

Occupation sites are most frequently found in the valleys on the Reservation. Their density is greatest around Flathead Lake, and along the banks of the Flathead River and its major tributaries. These are not directly affected by forest management activities; however, they may be indirectly affected through construction of roads or related industries such as log yards or mills.

Campsites. It may also coincide with an occupation site, a designation used here for a prehistoric camp or village where the knowledge of its existence was obtained through archaeology.

Rock Shelters and Caves. Due to the nature of the rock formations in western Montana, rock shelters and caves are very scarce. Only one site of this type, so far, has been reported on the Reservation.

Dwelling Depressions or Pit Lodges. It is expected that these will be found in western Montana; however, none have been reported so far.

Tipi Rings. Tipi rings are circles of stones or small boulders. The diameter ranges from 12-20 feet. In ancient times, they held down the covering of conical shaped lodges, such as tipis. Only three tipi ring sites have been reported within the present limits of the Reservation boundaries, but more could be observed in the future.

Root Roasting Pits. Root roasting pits are fairly common on the Reservation, and are quite distinctive. They are various sizes in diameter and depth.

Sweat Lodge Remains. The remains of sweat lodges, or even contemporary lodges, may be observed near a water supply such as a stream or lakeshore. Sometimes, sticks which once formed the shape of the lodge may still be present. In forested areas, some have been observed at the mouths of canyons; thus, they would be at the edges of forests and endangered by tree harvest or road construction into the canyons.

Pictograph Panels. Pictograph panels consist of drawings painted in red on rock cliffs, or on the walls of caves. Six sites have been recorded on the Reservation. Occasionally, pictographs were painted on trees. Foresters should be alert to these.

Vision Quest Sites. These were places where young men sought spiritual help in their quest for a more successful life. Most often, such sites are atop hills or lower mountain tops.

Since vision quest sites are in the mountains and on hills, they are vulnerable to timber growth and harvest activities. Since they are apt to be along crests and relatively flat places where logging roads and equipment are apt to be located, the area should be searched by investigators in an effort to find them before such operations begin. Vision quest sites, for example, have been reported on low mountain tops in the forefront of the Mission Range, just east of St. Ignatius.

Stone Piles. Stone piles on the Reservation originated mostly as offerings to guardian spirits by Indians travelling along trails. As the years passed by, the piles increased in size, and sometimes they appeared in a lineup along the trail. Most often, stone piles are present in mountain passes or on passes between river drainages. Thus, they are apt to be in forested areas.

Stone Quarries. These are scarce on the reservation and none are known to be present in forest lands. The same is true for pipestone quarries, one of which is known to be located near Flathead Lake, between Bigarm and Elmo. It is not on forested lands.

Burials. During the past, it was the custom to bury the dead near the camps where the person or persons had died. Usually, road building, erosion, or farm and ranch operations have inadvertently disclosed the presence of the few gravesites that have been found from ancient times on the Reservation. Burials have been found at the bases of rock outcroppings, and at the bases of talus slopes.

Battle Pits. A number of "battle pits" have been recorded on the Reservation. Some of these are on the edge of forest lands, or nearby where roadways giving access to the timber lands have already endangered them. Some have crude but discernible rock walls along portions of the pit walls, and at one site, there are several pits interconnected with trenches. Some have been found at the edges of timberlands while others are on lowlands, and would not be affected by timber operations. Sometimes, however, they may be found at mountain passes, or on low passes between river drainages.

Debarked Trees. Living trees, partially stripped of their bark on one side, are not usually recognized for their possible archaeological or historical value. More commonly, they are thought to be natural in origin. Several kinds of trees were debarked. These were mostly pines, but some deciduous trees such as young cottonwood (*Populus* sp.) also provided the sap. The practice has been discouraged by foresters since the 1920's since it damaged the trees, and reduced the value of the timber. The scar on the tree was usually in the form of a long triangle, straight on the bottom where the axe had cut, and converging several feet above at an apex. Debarked trees are still apt to be found in forests, and usually there may also be an occupation or campsite nearby.

Ceremonial Gounds. Almost all of these are of recent origin, and questions of their care and preservation could be a matter for tribal religious leaders and tribal authorities to determine.

Hot Springs. In the old days, hot springs were not only used for bathing people, but sometimes their medicinal properties were also utilized for horses.

Eagle-Catching Pits. Hill tops and ridge crests were the favorite sites for locating eagle-catching pits.

AESTHETIC CONSIDERATIONS

The Flathead Indian Reservation lies astride an important national north-south travel route (U.S. 93) extensively used by recreationists for travel to and from major national amenity resources (Glacier and Yellowstone National Parks, National Bison Range, and Flathead Lake). The eastern edge of the Reservation--formed by the spectacular Mission Mountains--is a superlative enhancement for those travelers and forms a magnificent backdrop to those living in the Flathead and Mission Valleys. On the southern and western boundaries of the Reservation, smaller, more rounded, forested ranges also provide significant aesthetic value for those viewing them.

Timber harvest and associated roads may alter the aesthetic attractiveness of characteristic landscapes to varying degrees depending on the design and intensity of the timber sale and the design and location of roads. Such issues are magnified when the landscape is a distinctive one, such as the Mission Mountains. Thus, it is important to inventory and evaluate aesthetics and incorporate this value into timber harvesting and road design.

The overall character of a specific landscape is created by its unique combination of visual features (such as land, vegetation, water, and structures) as seen in terms of form, line, color, and texture (U.S. Forest Service). These elements are present in varying degrees in a landscape, with form generally being the strongest and texture the weakest.

Variety is another concept which is important when assessing visual resources. Landscapes with variety are generally of greater visual quality than those without. Viewers are usually more sensitive to human-induced changes. On the other hand, monotonous landscapes, particularly forested ones, tend to display forest manipulations more easily than other areas.

Finally, managers of commercial timberlands are concerned with human-induced deviations from the characteristic landscape. These deviations are in the form of timber sales and road construction activity. Harvesting timber does alter the landscape.

Aesthetic Resources

Five distinctive character subtypes are present on Reservation commercial timberlands:

1. Mission Mountains. This character subtype forms the eastern boundary of the Reservation. It consists of steeply sloped lands rising to sharp, non-vegetated pinnacles, mountaintops, and ridges, particularly in the south. There are currently few visible human-induced changes in this landscape. The Mission Range is one of the most scenic areas of wild country in the United States. The land at higher elevations within the range is currently managed under a 1979 Tribal Council wilderness designation. The Mission Mountains Tribal Wilderness includes 89,500 acres.

2. McLeod Peak Area. This subtype is located in the southeastern portion of the Reservation with the Jocko River forming the northern boundary and the foothills in the Evaro area constituting the western boundary. The western part of this area is characterized by several deep valleys, steep forested slopes, and a relatively high topographic relief. The eastern part of the subtype is generally flatter, composed of continuous forest with the South Fork of the Jocko River deeply entrenched. This character subtype has had extensive timber harvesting and road construction with some of this activity visible from U.S. Highway 93.

3. Jocko Hills. This subtype is bounded on the south by the Jocko Valley, on the east by the Jocko River, and on the northeast by Dry Creek. It consists of rolling to moderately steep forested hills. The eastern portion of this area shows the results of extensive timber harvesting and road construction.

4. Nine Mile Divide. This subtype consists of rolling to moderately steep and heavily forested terrain, with occasional nonforested mountain peaks reaching about 8,000 feet in elevation. Several scattered lakes dot the higher

elevation areas. The subtype is located on the southern portion of the Reservation east of U.S. Highway 93 and south of State Highway 200. While many parts of this area have been subject to timber harvesting, there still remain relatively extensive areas free of human alteration.

5. Thompson Divide. The Thompson Divide forms the western boundary of the Reservation. It consists of rolling to moderatley steep forested terrain, yet relatively narrow in width. Timber harvesting has occurred in the past throughout the area.

IMPACTS OF MANAGEMENT POLICIES ON RESOURCES OF THE RESERVATION

The Forest Management Plan has been revised to provide long-term direction for managing forest lands on the Reservation. This plan covers the period 1982-1991 and contains several changes from the previous plan. These changes are deemed necessary due to changes in the forest's condition, new information about forest management and insect and disease problems, and changes in BIA and Tribal goals and objectives.

Management Goals and Objectives

The Flathead Indian Reservation Forest will be managed to achieve the objectives and goals established by the BIA and the Tribes. In developing the Forest Management Plan the BIA and Tribes are guided by federal regulations.

Objectives. The following objectives are listed in the Forest Management Plan. The first seven reflect the BIA's policy of sustained yield management as stated in the Code of Federal Regulations, Title 25, Part 163.

1. The development, maintenance, and enhancement of commercial forest lands in a perpetually productive state by providing effective management and protection, by applying sound silvicultural and

economic principles to the reforestation, growth and harvesting of timber and other forest products.

2. The regulation of the forest resources through the establishment of a timber sales program that is supported by written tribal objectives and a long-range multiple use plan.

3. The increased participation of tribal members in harvesting, management and marketing of their forest resources to promote self-sustaining communities, so that the Tribes may receive from their own property not only the stumpage value, but also the benefit of whatever labor and profit it is capable of yielding.

4. The sale of timber in open competitive markets to receive optimum fair market value in accordance with the wishes of the Tribes.

5. The preservation of the forest in its natural state whenever the Tribal Council determines that the recreational, cultural, aesthetic, or traditional values of the forest represent the highest and best use of the land to the Tribes.

6. The management and protection of forest resources to retain the beneficial effects of regulating water runoff and minimizing soil erosion.

7. The management and protection of forest lands to maintain and/or improve timber production, soil productivity, grazing, wildlife, fisheries, recreation, aesthetic, cultural, and other traditional values of the forest to the extent that such action is in the best interest of the Tribes.

8. The preservation of identified cultural, archaeological and historical sites.

Goals. Specific goals of the ten-year management plan period are as follows:

1. To conduct harvest operations in a manner which; (a) leaves the forest in the best possible condition for placing it on a sustained yield basis, (b) provides for succeeding cuts for a continuing and profitable forest business, and (c) is compatible with State-of-the-Art silviculture.

2. To pursue the harvest in stands at a rate compatible with the calculated allowable annual cut, utilizing even-aged, uneven-aged and temporary even-aged management systems.

3. To vigorously pursue the salvage of both mortality and imminent mortality where feasible.

4. Take appropriate presuppression and prompt and effective management action when required to protect the forest from insects and disease.

5. To continue habitat typing of the Reservation forest and to provide a permanent base for land-unit planning.

6. To promote the completion of reservation soil survey on forest lands and contract the development of land productivity classes by correlating soil types and habitat classification.

7. To progressively increase annual growth, and consequently, allowable cut through increased commercial and precommercial thinning, mistletoe control and rehabilitation when economically feasible.

8. The precommercial thinning and mistletoe control goal is to remain current with all uneven-aged harvesting operations and eliminate any backlog.

9. To insure prompt regeneration of harvested units on intensively managed lands.

10. To develop and implement a tree-improvement plan for the production of genetically improved stock.

11. To maintain the permit and small timber sales program to provide opportunities for bonafide Indian loggers, conduct sanitation/salvage operations, and to harvest isolated timber tracts.

12. To make intermediate cuttings from allotments with the following guidelines and advantages:

    a. Priority given to requests made by aged Indian people so they may receive benefits from their timber ownerships.

    b. Wherever possible grouping several allotments with tribal land into one unit to encourage competitive stumpage prices and to reduce administrative expense.

    c. To manage for the highest and best use and maintain the land in a productive state.

13. To identify and secure permanent access to all major timbered areas on the Reservation.

14. To implement a management plan for the lodgepole pine component.

15. To develop in cooperation with the Tribes a diversified Christmas tree harvest and marketing program.

16. To continue to develop markets for unmerchantable material.

17. To manage road closure, implementing the needs and desires of the Tribes, to protect wildlife habitat and forest investment areas, and to discourage arson, trespass and poaching.

18. To continue to develop and implement a fire and fuels management program including presciption burning, hazard reduction, let-burn, smoke management, fuel manipulation, training, etc.

19. To initiate a cumulative impacts study which will indicate the effects management activities have on different resources.

Impacts of Policies on Forest Resources

Anytime changes take place in a forest ecosystem brought about by manipulation or by a "let-alone" policy, some positive benefits will occur, along with some negative effects. Thus, a trade-off of acceptable negative effects is made to attain the desirable positive benefits. For most of the negative impacts, mitigating measures may be used to lessen these impacts.

The following section is a review of the thirteen policies proposed for management of timber and other resources. For each policy, the BIA has developed a proposed alternative. This report assesses direct and indirect impacts of the proposed alternative on thirteen resources on the reservation. Table 1 is a summary of these impacts. In studying the table, the reader should keep in mind that the impacts in many instances are difficult to classify, since both positive and negative impacts may occur; one impact may strongly outweigh the other impacts. Also, mitigation may lessen negative impacts.

Fire Suppression Policy. Historically, BIA's policy has been to take action to suppress nearly all fires on the Reservation. As most other forest land managing agencies have done, the BIA has conducted an active public educational program to institute a "total suppression" fire management policy. It is expected that all fires on the Reservation will be extinguished. This policy, however, does not acknowledge the beneficial effects fire can have on the environment or the role fire plays in keeping check on fuel hazard build-up

Table 1. Impacts of Management Policies on Resources of the Reservation.

Management Policies	Geology	Surface Hydrology	Range	Soils	Timber and Other Vegetation	Wildlife	Fisheries	Wilderness	Recreation	Archaeology/Cultural Heritage	Human/Community Developments	Threatened/Endangered Species	Ecological Interrelationships
Fire Management Program													
Fire Suppression Policy	3	2	4	M	1	4	M	5	M	5	M	4	M
Timber Sale Program													
Sale Size	3	3	4	4	4	M	-	4	-	3	2	3	M
Timber Sale Unit Design and Priority Policy	3	4	-	-	1	-	2	4	4	-	-	-	M
Silvicultural Program													
Christmas Tree Cutting Policy	3	4	3	3	5	-	3	-	-	3	M	-	4
Precommercial Thinning Treatment Policy	3	3	2	-	1	M	3	3	M	-	2	3	-
Even-Aged Block Size Policy	4	4	2	3	2	2	3	3	5	-	2	3	4
Mistletoe Control Policy	-	3	2	4	-	4	3	3	4	3	M	M	M
Lodgepole Pine Management Policy	4	4	3	5	1	4	4	-	M	3	2	4	M
Marginally Productive Sites Policy	1	1	-	1	3	1	1	1	1	1	1	1	1
Other Resources													
Stream Reserve Corridor Policy	1	1	4	2	4	1	2	2	2	1	3	2	2
Big Game Winter Range	3	3	2	3	4	2	3	2	2	3	3	1	2
Old-Growth Timber Policy	3	3	2	4	1	5	3	3	5	-	M	M	4
Grazing and Commerical Timber Lands Policy	4	4	1	4	4	5	4	4	4	3	2	4	4

Impact Rating Code:

1 = Very positive benefits
2 = Somewhat positive benefits
3 = No impact
- = Unable to determine
4 = Somewhat negative impacts
5 = Very negative impacts
M = Mixed impacts: some positive, some negative

in the forest. Oftentimes too, resource values at risk from a fire are not commensurate with fire suppression costs, therefore making a "total suppression" policy economically questionable. Proposed Alternative (No Action Alternative): Continue present policy, i.e., rapid control of all destructive wildfires.

Fire suppression will protect commercial timber. However, total suppression may lead to fuel accumulation and possibility of catastrophic fires. Nutrients will be tied up in litter and regeneration may be suppressed. Wildfires don't harm soils much, except to remove the duff layer. Naturally ignited fires in wilderness insures natural fire pattern development. Catastrophic fires lead to excessive sediment loads and erosion, and are detrimental to water quality and fisheries. Wildfires lead to loss of social, cultural, economic and recreational resources. Burned areas are aesthetically undesirable for some time.

Fire suppression is advisable for old-growth timber dependent wildlife. Wildfires can kill wildlife. Wildfires create forage for deer, elk and moose, while destroying cover. Fire suppression may adversely affect prey species for the gray wolf and peregrine falcon, and huckleberries for grizzlies. However, fires may destroy nesting and roosting trees for bald eagles. Forage for livestock increases after fire.

Wildfires have little impact on most archaeological/cultural resources since it is likely the sites have already burned in the past. Fire suppression activities, however, may physically destroy such sites.

Adverse effects of wildfire suppression can be mitigated by controlled burns and sometimes by logging.

Sale Size Policy. Sale size affects the forestry program's administrative and technical workload and the overall economics of sawmill and wood procurement operations. It also affects the economic viability of small to mid-sized

Indian loggers and stumpage income of the Flathead Tribes. The Bureau and tribes are interested in maximizing economic returns but still providing opportunities to Indian loggers and Indian forest product enterprise.

Proposed Alternative (No Action Alternative): Continue present policy, i.e., most sales will range between 2-10 MMBF, with occasional sales to 20 MMBF.

Sale design is probably more important than the size of the sale. Many smaller sales will require more roads, and more soil and vegetation disturbances will occur than for a few larger units. More roads reduce the growing acreage, spread noxious weeds, and permit easier hunter access into unroaded areas (unless roads are closed).

A combination of sale size, distribution and drainage basin character determine erosion, sedimentation and water quality. Cumulative effects of many small cutting units may be as great or greater than those of a few large units. The most hydrologically conservative timber sale program would be many small units under uneven-age silvicultural prescription.

The larger the cutting unit, the greater will be the potential for adverse impacts on forest-dwelling wildlife. However, human disturbance may be greater with a greater number of cutting units than with a few large ones due to displacement. Sale size is probably less critical than insuring that critical areas for wildlife are protected from destruction and human activities are kept at a minimum during critical seasons.

Small sale sizes will increase livestock management problems. Cattle may tend to stay on a small unit longer, leading to tree seedling destruction and uneven grazing on the allotment.

No direct adverse impacts are expected in the wilderness area. However, trail heads may be disturbed if within a cutting unit, leading to changes in access patterns.

Sale size should have no impacts on sociological or archaeological resources. Economically, smaller cutting units might insure income flow from the timber resource.

Timber Sale Unit Design and Priority Policy. Present timber sale policy calls for sale units to be designed on an area basis (e.g., valley to divide and drainage to drainage). Therefore, units include a wide range of timber types and stand conditions and require a variety of silvicultural treatments and harvest methods. There are some small, separate sales for specific products (i.e., small logs for studs and houselogs) but, for the most part, this is not the case. Both the BIA and Tribes are interested in maximizing economic returns and application of good silvicultural practices. Proposed Alternative (No Action Alternative): Timber sale unit design and priority for offering based largely on silvicultural needs and mitigate adverse impacts on other resources.

By following the proposed alternative, silvicultural impacts will be minimized. However, if all timber sale unit designs and priorities are based solely on silvicultural needs, deficit sales may result. Hydrologic impacts are generally smaller and of shorter duration in uneven-age stand management. To the extent that road density must be increased to apply this alternative, long-range productivity will be sacrificed for short-term gains. Extra roads and mechanical activity may also adversely impact soils. A riparian zone protection policy is suggested to protect fisheries and critical wildlife habitat.

Decisions regarding sale unit design will greatly influence the forest structure and composition, which will, in turn, have a great influence on wildlife species. Sale unit designs that stress silvicultural needs may have adverse influences on wildlife habitat structure and composition, so that threatened and endangered species may be directly influenced. If adverse impacts are mitigated, there should not be a problem. Generally, managers should protect threatened and endangered species from human disturbance through timing of sales. Also, if managers adequately maintain an interspersion of the different successional stages of all habitat types (i.e., maintain habitat diversity), then a full complement of wildlife species can be maintained also.

When sales are designed on the basis of silvicultural needs, livestock forage on each will be unequal. Some areas will become more heavily grazed than others. This may result in regeneration problems. Roads into areas will increase the accessibility of areas to livestock, thus increasing usable forage but causing possible conflicts with timber and wildlife resources. Grazing capacity on individual grazing allotments will be affected, increasing in some units while decreasing in others due to logging activities, physical barriers caused by slash, and incompatability with tree regeneration.

Harvesting of timber from lands having recreational value may significantly change biophysical aspects of the setting and access to and within it. The current policy, over time, changes unroaded primitive or semiprimitive settings to semiprimitive motorized or roaded natural settings depending on the intensity of the harvest, the silvicultural prescription, and amount of road construction. Road access policy following completion of the harvest may also change the nature of the recreational setting.

The plan appears to be based on ecologically sound concepts of sale design. Economic constraints are often of over-riding concern in sale design, but a single cutting unit that has two forest habitat types or two distinctly different soils can produce ecological problems when treated as one unit. Social factors should also be strongly considered, but potential impacts are difficult to assess.

All timber sale areas have the potential of including archaeological and cultural heritage sites. As discussed in other sections, any surface disturbances (logging, roading, slash disposal, etc.) which occur on such sites can alter or destroy the archaeological and cultural values. All timber sale designs should take into account the protection of these sites. When roads are built into isolated areas having sites of archaeological and cultural heritage, the potential is increased for people to visit these areas and discover such sites. Indirect impacts can be minimized by closing these roads to public travel.

Basing sale units largely on silvicultural needs carries with it a connotation of lack of concern for the environmental consequences in the watersheds affected. The statement that adverse impacts will be mitigated, however, indicates that only those silvicultural practices will be used that will allow mitigation.

Christmas Tree Cutting Policy. Christmas tree harvest is a very political issue on the Flathead Reservation because many tribal members economically benefit. On the average, over 300 harvest permits are issued and 200,000+ trees are harvested annually. Because the issue is politically sensitive, BIA and tribal efforts to control Christmas tree harvest in the past have been nearly ineffective, and forest resource damage has been done. "Leave trees" in thinned areas have been harvested, and there hasn't been adequate control over cut tree or area selection, which has resulted in disgenic tree harvest practices and, quite often, stocking problems. Proposed Alternative (No Action

Alternative): Keep present policy of unregulated Christmas tree harvesting. The present policy of unregulated Christmas tree harvesting cannot be continued without serious adverse impact on the forest resources, especially future growing stock and regeneration. Silvicultural control of stand development density, spacing, species mix, and age class structure is not possible if uneducated, unregulated Christmas tree cutting is allowed. Stands that need thinning frequently have trees of low crown ratio which are undesirable for Christmas trees. The Christmas trees which are cut are genetically best, leaving inferior genetic stock on the site. Most harvested Christmas trees are viable commercial timber trees whose future value will be lost. Branch turn-up often results from careless Christmas tree cutting, resulting in deformed stems and no thinning.

The major hydrologic consequence of unrestricted Christmas tree cutting is that it prolongs, often indefinitely, the hydrologic recovery of a site which has been harvested. No impacts are expected on the geology, fisheries, soils and range resources.

The random but fairly constant presence of Christmas tree cutters may cause temporary displacement of wild ungulates on fall ranges and may lead to increased harvest of these ungulates by chance encounters. Trees (especially Douglas-fir) sometimes invade grasslands at lower timberline that may be used as winter foraging areas by elk. Removal of these small trees for Christmas trees will help maintain important winter forage.

Unregulated Christmas tree cutting could potentially result in severe negative impacts to certain recreational settings. Intensive removal of small trees in recreational settings could substantially change the nature of that setting.

Christmas tree cutting is an activity providing income for Tribal members. Thus, the draft plan recognizes a potential conflict between immediate income to tribal members and long-term income from saw timber stands. Consideration should be given to restricting Christmas tree harvest only to certain sites, and to establishing a tribal enterprise which buys trees from tribal members and markets them on behalf of the tribe. A combination of tree stand improvement and Christmas tree harvest is recommended.

Any impacts on sites of archaeological and cultural heritage are anticipated to be those which bring people into direct contact with these sites. Cutting should be directed away from these sites.

Precommercial Thinning Treatment Policy: The BIA contends that current policy and guidelines are not flexible enough to maximize the benefit/cost outcome of the Flathead thinning program. The tribes have banned dozer thinning, thinning guidelines prevent removing trees over five inches diameter at breast height (dbh) except for culls or diseased trees, and a 15 ft. x 15 ft. leave tree spacing requirement is required over the entire range of sites thinned. It is considered that the foregoing requirements often preclude thinning to optimum, site specific stocking levels and therefore detract from the cost effectiveness of the timber stand improvement program. Proposed Alternative: Set treatment priorities/base site selection on site quality, and vary thinning prescription to obtain optimum site-specific stocking level. Lift all constraints on treatment methodology.

Environmental conditions of sites selected for precommercial thinning should not change in environmental character provided treatments are in keeping with the site conditions. Varying thinning spacing would not affect the geology, watershed characteristics, soils, fisheries, or range forage to any extent. There may be some concern of treatment effects regarding dozer and herbicide thinning if constraints on their use are lifted. Dozers lead to soil disturbance and compaction, while herbicides may lead to environmental contamination and killing of forbs and shrubs used as forage.

The proposed guidelines are a significant improvement over the present "cookbook" rules, and they maximize silvicultural management.

Dense stands near big game winter foraging areas are favored bedding sites for big game. Thinning of these stands will be detrimental to big game. Since the Forest Management Plan states that a wildlife plan is worked out for each thinned area, it can be assumed that problems with bedding sites will be prevented. Dense "doghair" sapling stands on summer ranges are avoided by big game animals, so that thinning of such areas may result in increased big game (deer and elk) use.

This alternative should have no impacts on the wilderness area. Removal of all thinning treatment constraints such as dozer thinning may lead to adverse visual impacts in some cases. Adverse impacts could be mitigated by removal and acceptable disposal of slash. The current policy of providing for thinning may enhance the visual attractiveness of some stands as long as slash is properly removed or disposed of. If thinning requires construction of new roads, the additional access may change the nature of the recreational setting or may increase the demand for adjacent unroaded areas.

Serious direct damage may occur to archaeological/cultural heritage sites because of mechanical activity.

The preferred policy implies considerable employment opportunities for tribal members in thinning contract work.

From an ecological standpoint, thinning is best performed in the young stand before any heavy equipment is needed. Trees that begin growth with the proper spacing by about 20 years of age are more likely to grow well throughout their lives than those that begin early growth with severe competition.

The plan mentions removal of all unmerchantable stems that are infected. This is reasonable, but in a stand with multiple ages, old individuals that are of merchantable size may need to be removed to eliminate the source of seeds.

Precommercial thinning creates one problem: slash. It normally cannot and should not be burned unless it presents a severe fire hazard. At the same time, deep slash can dry slowly, encouraging build-up of *Ips* populations. This problem presents a good argument for thinning early in the life of the stand to maximize growth potential, minimize the amount of nutrients tied up in biomass that will never be merchantable, and reduce the chances of beetle epidemic.

Even-Aged Block Size Policy. Under the present forest management plan, the tribe has constrained clearcuts and seed tree units to a maximum size of eight acres. Shelterwood units have been constrained to a maximum size of 15 acres. There have been some departures from these constraints over the past decade, but for the most part, the size standards have been observed. The size limits have hurt efforts to apply the best silviculture possible (e.g., mistletoe control in eight-acre blocks is ineffective) and have added a very heavy technical and administrative workload to both presales and sale administration. The Bureau of Indian Affairs feels that more flexibility in even-aged management is necessary, and that relaxing cutting unit block size constraints will provide the needed flexibility. *Proposed Alternative*: Increase shelterwood unit size to an average of 25 acres and clearcut/seed tree block size to an average of 10-20 acres, except where constrained by visual objectives.

Increasing the size of shelterwood and clearcut/seed tree block size can significantly increase the rate and cumulative impact of soil erosion, unless site selection is carefully planned, numbers of cutting units are reduced, and harvesting methods are closely monitored. The direct impacts on specific sites are increased erosion, degraded water quality, higher suspended and dissolved load in the stream(s) draining the affected watershed, and less chance for successful regeneration because of soil and nutrient loss after cutting. Principal consequences on geology, hydrology and fisheries were discussed under the Sale Unit Design and Sale Size sections.

Even-aged management will increase livestock range by increasing transitory range. Clearcuts averaging 10-15 acres in forest habitat groups B, C and D have the potential to significantly increase livestock forage where slopes are not too great (<50%). The carrying capacity of an allotment will be increased.

As long as precautions are taken against erosion or compaction damage at the time of entry, cutting unit size should not harm most forest soils.

Large clearcuts are only undesirable silviculturally if seedling establishment problems result. Growth of several species (for example Douglas-fir and larch) being managed for are promoted by large clearcuts; in fact, overstocking will result on small clearcuts. Cost and management efficiency of site preparation, logging engineering, planting, etc. are all optimized by increasing even-aged block size.

Generally, the small, even-aged block sizes proposed in the Management Plan will be favorable for wildlife, assuming that the blocks are allowed to recover to the sapling stage before another block is cut adjacent to the first. Over time, this should produce well interspersed blocks in various seral stages and habitat types. This would be a diverse habitat for wildlife, with an abundance of edge. No adverse impacts are expected for threatened and endangered species.

No significant impacts are anticipated on the tribal wilderness. Increasing the size of clearcuts could somewhat adversely affect the visual quality from a recreation standpoint.

The same impacts are expected on archaeological/cultural heritage sites as with any timber harvesting practices.

Generally, this policy will reduce administrative costs of sale administration and preparation. The impact on tribal income is not clear since the BIA apparently incurs these costs.

Even-aged management is questionable for tolerant species. Their regeneration becomes more difficult as the size of the cutting unit increases.

Mistletoe Control Policy. The current management plan calls for treating one-third of all Class I and II mistletoe-infected stand acreage every 20 years. This schedule would provide for treating (even-aged harvest followed by mistletoe control TSI or conversion to non-host species) all Class I and II acreage after 60 years. Proposed Alternative: Accelerate treatment of mistletoe-infected stands to complete coverage in 40 years.

By allowing a 40-year cycle to harvest the infected stands, and planning the harvest after site specific analysis, the impact of clearcutting can be minimized and other resources protected. Thinning control should not affect soil or water resources. Neither should fisheries or wilderness resources be adversely impacted. Care should be taken to "spread out" the sanitation effort over all acreage so as to avoid overcutting in any one watershed. Other factors that must be considered in the "allowable cut" harvesting include beetle problems, sale scheduling considerations, and manpower.

It is estimated that spread rates are fast enough to cover nearly all susceptible forest in 60 years. Such heavy infections as occur in some areas create ideal fuel conditions for wildfires that can destroy thousands of acres of valuable timber and wildlife habitat. Dwarf mistletoe spreads at the rate of 15-35 feet per year. Each infected tree has the capability of infecting another tree or reinfecting itself each time the plant reproduces. No effective biological controls have been found.

There is no scientific evidence that mistletoe can be eradicated by clearcuts of any reasonable size. Instead, more attention should be paid to using less susceptible species, shortening rotation ages, and reducing mistletoe to manageable levels. This evidently is intended. It is important to remove infected understory trees since these merely grow up to infect the new understory. Also, removal of slow-growing timber might be replaced with rapid-growing young stands.

Noncommercial forest land will apparently not be treated for dwarf mistletoe. It should be low priority, but if not treated, it will ultimately reinfect adjacent commercial lands.

Treatment of infected stands by thinning or clearcutting will increase livestock and big game forage. Slash disposal is important in allowing unrestricted livestock use.

Decadent stands infected with mistletoe are often valuable habitat for wild ungulates as well as for many other wildlife species. Generally, treatment of mistletoe-infected stands will influence wild ungulates (deer, elk and moose) by reducing cover. If these cover areas are adjacent to or near winter foraging areas, the treatments will probably be detrimental to wild ungulates, especially so during severe winters. Management activities may displace threatened and endangered species. These activities should be seasonally avoided in areas critical to these species. Cover areas for grizzly bears will be reduced, but there may be some increase in bear food production.

Under an accelerated treatment program, such visual and recreational values are likely to be given a reduced emphasis, thus potentially increasing negative consequences to them. Shorter periods between re-entry suggests long-term allocation to timber over other values.

Lodgepole Pine Management Policy. In the past, lodgepole pine harvest has been largely unregulated post and pole cutting by tribal members. Recently, however, the tribes indicated by resolution that they want the Bureau of Indian Affairs to intensify lodgepole pine management to assure that the S&K Post and Pole Enterprise has a perpetual supply of raw material. The Bureau of Indian Affairs has inventoried the resource and is presently preparing a lodgepole pine management plan to develop and manage the lodgepole pine portion of the Flathead commercial forest. Lodgepole pine management is a political issue because individual tribal members make a living from the resource, and efforts to change from the traditional unregulated method of operations in lodgepole pine are controversial. The Bureau and the tribes feel that intensification of management in the lodgepole pine type is essential, but there are others who question the need for change. Proposed Alternative: Continue present policy of intensifying lodgepole pine management and access the inaccessible portions of the resources.

Direct impact of the opening of new areas for lodgepole harvest will cause increased erosion and soil loss associated with road-building and water quality reduction related to erosion. Fisheries could be adversely affected. Depending upon harvest practice, stand removal could increase pollution of water and soil removal prior to stand regeneration. The overall impact on the Reservation should not change greatly, however, over that of past unregulated cutting practices.

Access requires the construction of 150 miles of roads, about half of which will be built during the 10 years to which this plan is addressed. The other half will be built during the next 10-year period. As harvesting continues, steeper slopes will be accessed because gentle slopes are entered first. Road construction will cause some significant adverse impacts to the soils as cut and fill slopes are notorious sites of soil erosion.

Lodgepole pine can have very rapid juvenile growth. Its utility in short-rotation silviculture is important to consider. Small saw log mills may use the logs for saw lumber, while whole-tree harvesting/chopping may provide a market for any size tree. The economy of the tribe could be enhanced through establishment of a long-term operation.

Lodgepole pine types generally supply little grazeable forage. Lodgepole stands which receive even-aged management may supply some transitory range.

The importance of lodgepole stands as mule deer, elk, and moose summer range is recognized in the Forest Management Plan. Block size limitations will be observed. Reduction of habitat effectiveness for elk, and perhaps deer and moose, because of increased access, appears to be the greatest cause for concern in increased lodgepole pine management. However, possible detrimental effects from increased access can be reduced by road closures. There will be no significant impact on the peregrine falcon and bald eagle by implementing any of the mentioned lodgepole pine management policies. However, cover for the grizzly bear and wolves may be reduced as a result of the intensive lodgepole management activities.

Lodgepole pine harvesting may occur in close proximity to wilderness boundaries, resulting in various sight and sound impacts.

The policy could disrupt visual and recreational values if they are not accounted for in the process of identifying which areas will be subject to intensive management. Construction of 150 miles of new road will reduce the amount of unroaded opportunities available, but provide access for other types of opportunities.

Marginally Productive Sites Policy. The BIA expends human and financial resources managing sites producing less than 20 cubic feet per acre per year (e.g., ponderosa pine/bunchgrass and upper subalpine habitat types). In many cases, harvest entry in these types is only marginally economical. Some feel that all forested lands should be equally managed, others feel that management should focus their efforts only on the "better," more productive sites.
Proposed Alternative: Identify lands with productive capabilities of less than 20 $ft.^3$/Ac/Yr and de-emphasize timber management.

By de-emphasizing timber production on marginally productive sites, there is much less possibility of degrading the environment: geology, soils, watershed, fisheries, recreation, wilderness experience, archaeology/cultural heritage, timber, and wildlife.

Livestock forage is generally enhanced by harvesting trees. However, such marginal sites generally won't produce much more forage if trees are removed.

Consideration of using available investment funds on the more productive sites will assure a better investment return than spreading the funds across all sites.

Stream Reserve Corridor Policy. Research has demonstrated that streamside habitat and vegetative communities are critical to many species of fish and wildlife and to water quality. The tribes and BIA want to protect these critical areas from timber harvest damage but only to the extent necessary since economic timber tradeoffs are required. Present policy requires that a two-chain-wide reserve be left on each side of live streams and that all harvest activities (e.g., skidding, etc.) be excluded from the reserve area. Presently, the streamside reserve acreage is not deducted from the timber base. The real issue is whether or not the present streamside reserve policy is too inflexible. Proposed Alternative: Classify all riparian/water influence zones as restricted timber management zones.

The Management Plan does an excellent job of acknowledging the importance of riparian zones for all uses. Classifying all riparian/water influence zones as restricted timber management zones should furnish adequate protection on most sites, particularly where a two-chain-wide reserve is left on each side of live streams. However, buffer zone requirements vary with slope, aspect and wildlife use.

This alternative should protect the geology, watershed, fisheries, soils, and archaeological/cultural heritage sites within the riparian zones. Riparian zone protection is absolutely essential to the maintenance of good quality fisheries habitat.

If the tree cover is reduced, livestock grazing capacity would be increased. However, numerous wildlife species require or show preference for riparian areas for all or a portion of their life cycle. Therefore, the increase in livestock forage would be at the expense of wildlife. At present, it is not clear that riparian or other moist sites can be improved overall for wildlife by logging. At times, windfall in these sites may be common and produce dense tangles of downed boles in old streamsides. This downfall restricts the movement of the large ungulates, hinders their access to water and can trap animals, making them easier prey while feeding or drinking. Another problem in riparian zones is windfall blocking the streams and interfering with fish movement. Logs can change the turbulence patterns of streams altering plunge pools and bottom sediment patterns essential to spawning. These observations suggest that some management of riparian habitats may be needed even though they would not be intensively managed for timber.

Streamside set asides will reduce cash receipts for timber. Riparian sites can have the highest growth rates in the area if well drained. Optimally, silvicultural treatment to provide sanitation logging near the stream may be needed. Retaining decadent old-growth could provide an insect and disease center.

Big Game Winter Range. Big game often can utilize only 10% of their total range in the winter. Winter is a time of severe weather and food shortage, and therefore may be a limiting factor to the big game population. Present policy is to consider winter range on a sale by sale basis and exclude those areas identified by wildlife biologists as key winter range. The tribes and BIA both feel that big game management on the Reservation is essential. Proposed Alternative (No Action Alternative): Delineate important winter range locations, in consultation with wildlife specialists, for each timber sale and constrain timber harvest as needed to minimize adverse impact on winter range.

The Forest Management Plan recognizes that big game winter ranges are limited and varied, and therefore are very important to large ungulates. The decision to consult wildlife specialists on all timber sales planned on winter ranges is commendable. However, timber managers should recognize that: (1) On winter ranges where forage is not the limiting factor, logging cannot be used to improve conditions for wintering big game; (2) Optimal habitat quality for big game animals, and optimal timber production cannot be achieved on a given winter range simultaneously; and (3) Winter ranges do not provide entirely for the nutritional needs of large ungulates, so conservation of stored energy as well as energy intake is important to wintering animals. Thus, human disturbance of wintering animals should be reduced to the lowest possible level, especially in deep snow areas or during winters of above normal snow depths. Because logging is disruptive to soils and wildlife, logging frequency should be minimized in winter range areas.

One problem with maintaining winter range on forested areas is its dependence on periodic fires. A light fire is needed every 15-20 years to stimulate shrub regrowth. If wildfire is excluded as is proposed in the Management Plan, then shrubs grow too tall, so that the tender new shoots are beyond the reach of big game.

Maintenance of a sense of priority on big game winter range will reduce potentially negative impacts to populations, thus increasing the probable hunting success rate and opportunities for wildlife observation. With an increase of available winter range, any use on wilderness would be reduced.

Designation of big game winter range will not adversely impact surface hydrology. Limiting other management activities will help maintain high water quality. There would be no adverse impacts on soils, fisheries, threatened and endangered species, archaeology/cultural heritage or geology. This policy should reduce competition problems between wildlife and livestock.

Limiting silvicultural activity to summer and fall eliminates the choice of winter logging on snow, which is an important option for such management options as overstory removal of shelterwoods to protect regeneration and minimize soil disturbance.

The loss of timber resource can result if thermal and hiding cover areas are not logged. Minimizing roads may preclude access to adjacent stands for harvesting. The concentration of animals on a winter range usually causes heavy browse damage to tree regeneration.

Old-Growth Timber Policy. Present policy calls for putting most non-wilderness and inaccessible forest lands under intensive management which requires that all old-growth timber in the commercial forest be managed. The plan provides for retaining old-growth timber within some limited management areas, specifically, within stream-side management zones. Certain wildlife species require old-growth timber (at least as a component within younger stands) for all or part of their life cycle. Some people feel that the present policy will have a negative effect on species requiring the old-growth component and that it should be changed to provide reservation-wide enclaves for these species of wildlife. Proposed Alternative (No Action Alternative): Continue present policy of cutting all old-growth stands outside wilderness, inaccessible areas, and stream-side management zones.

Old-growth stands are typically not growing at all. Usually, mortality is exceeding incremental growth. Hence, silviculturally, the site potential is being wasted. Whenever merchantable old-growth is left, there is a loss of current value and a long-term loss or reduction of productivity of the site. Additionally, isolated old trees may seed the area with either a species or genetic strain that may be unwanted. Ultimately, these large "leave" trees will inhibit development of the new stand. Leaving blocks of old-growth provides insect and disease centers and also a fire hazard. Thus, from a silvicultural perspective, cutting old-growth stands would have a beneficial effect.

Impacts on geology, hydrology, fisheries, soils and archaeology/cultural heritage are those discussed in previous sections where policies relate to timber harvesting.

Old-growth stands on permanent forest range may supply valuable forage for livestock, especially stands that are open enough to furnish adequate forage. Cutting of stands in Group A would not lead to much of an increase in forage.

The essence of the plan is to cut old-growth stands if appreciating fast enough in value. No adverse economic impacts are anticipated.

Old-growth stands provide a diversity of cover and forage (in some habitat types). Because of snow intercept by old-growth crowns, wild ungulates are sometimes better able to winter in stands in areas of greater snowfall than is possible in younger forests. Removal of old-growth in these areas will probably lead to locally reduced wintering deer and/or elk populations. Snow intercept benefits deer more than elk or moose. Needs for old-growth timber by other species is less understood and needs further study.

Bald eagles require old-growth trees for nest sites and roosting. Old-growth stands used by eagles should be protected. There will be no significant impact on the peregrine falcon, wolf, and grizzly bear by the retention of old-growth timber.

This policy may eliminate using some forested regions of the Reservation for education of tribal members concerning natural history. A policy of elimination of old-growth stands would reduce the opportunities for nature appreciation, interpretation and viewing in areas outside wilderness.

Ecologically, this plan excludes a valuable resource from future study. The ecosystems that are represented in existing old-growth need to be studied indefinitely.

Grazing and Commercial Timber Lands Policy. Grazing has occurred on the Reservation since it was established. Grazing use is controlled through a permit system. It is felt by some people that grazing on commercial timber land may be inhibiting regeneration and creating soil compaction problems in some areas. To date, no policy has been formulated to deal with this issue. Proposed Alternative: Identify commercial forest lands currently/potentially valuable for livestock grazing and develop use restrictions to benefit forage and timber.

Adverse impacts may occur to the geology, soils, water quality and fisheries if livestock grazing is increased to the extent that soil compaction occurs. However, in a forest environment such problems should be relatively minor. Designation of hydrologically sensitive areas and restricting grazing in those areas would minimize conflicts and degradation of the soil and water resources.

Proper grazing and timber production are compatible and may be complimentary at larger tree basal areas on the drier habitat types. Herding of livestock may be necessary to achieve "proper use" and reduce damage to tree seedlings. In other instances the installation of fences and other facilities may be required to restrain livestock from sensitive areas. Where livestock concentrate for long periods, damage to seedlings will likely occur.

Compaction of soil should not be a problem if cattle are frequently moved and are not introduced before the soil surface becomes dry in the spring. The forest plan over-stresses the influence of compaction of soil by livestock on timber production. With very minimal riding, compaction would be a problem only on concentration areas.

Livestock grazing could be beneficial by exposing mineral soil for tree establishment, reducing competition from herbaceous and browse species, which enhances the survival and growth rate of seedlings. In addition, grazing may reduce fire hazards and result in less damage when fires do occur.

The Flathead Indian Reservation has a total of 51 designated range units which encompass 335,000 acres. Approximately three-fourths of these acres are forested. A majority of the 51 units are permitted to 6 Indian Stockman Associations and to individual Indian stockmen. For many of these stockmen, livestock are their primary source of income.

Reforestation, especially planting, is expensive. Cattle may destory small seedlings by trampling, rubbing and browsing. Extensive damage may warrant replanting; however, by that time, brush has often grown enough that site preparation is necessary.

Cattle should be kept off plantations until saplings reach above the height of the grasses and forbs used for forage. Once seedlings are large enough, grazing may reduce competing grass vegetation and be a benefit to tree growth. However, animal distribution is critical to keep animals from concentrating and causing soil compaction on areas of high clay content. Cattle may browse on tree seedlings when the forage is dry or dormant.

On summer ranges, researchers have found that elk avoid areas used by cattle. Both cattle and elk prefer moist sites. Roads associated with timber harvest provide access for cattle to areas of elk summer range, and thus increase the potential for interactions between elk and cattle. Elk are further harassed by the periodic presence of herders checking cattle condition or moving them about. The construction of fences, required to restrain livestock movements, may conflict with accustomed migratory routes of big game animals. Coordination with wildlife biologists will lesson the likelihood of this occurring.

If livestock operators make continual checks on their stock (fences, salt, range readiness), it is possible to harass threatened and endangered species as well as other species, leading to abandonment of the site. If wolf populations recover, increased use of forested areas by livestock could lead to increased predation by wolves. Grizzly bears may also prey on livestock occasionally (especially sheep and cattle).

If grazing occurs on commercial timberlands adjacent to the wilderness boundary, cattle may stray onto wilderness lands and cause severe problems. Influences on recreational activities are in terms of the presence of livestock, range developments, manure piles and associated flies as these influence recreational pursuits.